Human Body Systems and Disease

7-3 The student will demonstrate an understanding of the functions and interconnections of the major human body systems, including the breakdown in structure or function that disease causes. (Life Science).

7.3.1 Summarize the levels of structural organization within the human body (including cells, tissues, organs, and systems).
Taxonomy level: 2.4-B Understand Conceptual Knowledge

Previous/Future knowledge: In 4th grade (4-2.3), students explained how humans use their sensory organs. In 5th grade (5-2.1), students were introduced to concept of cells where they learned the major structures including cell membrane, cytoplasm, nucleus, and vacuole. In high school Biology, students will study the cell theory and explain how cell differentiation serves as the basis for the hierarchical organization of organisms. This is the first time that students have studied levels of organization within the human body.

It is essential for students to know that the human body is divided into specific levels of organization and that these levels are what make the human body a complex organism. The levels of organization, from the simplest level to the most complex are:

Cells
- The basic units of structure and function within the human body.
- Though all cells perform the processes that keep humans alive, they also have specialized functions as well.
- Examples may be nerve cells (neurons), blood cells, and bone cells.

Tissues
- A group of specialized cells that work together to perform the same function. There are four basic types of tissue in the human body:
  - *Nerve tissue*—carries impulses back and forth to the brain from the body
  - *Muscle tissue* (cardiac, smooth, skeletal)—contracts and shortens, making body parts move
  - *Epithelial tissue*—covers the surfaces of the body, inside (as lining and/or covering of internal organs) and outside (as layer of skin)
  - *Connective tissue*—connects all parts of the body and provides support (for example tendons, ligaments, cartilage)

Organs
- A group of two or more different types of tissue that work together to perform a specific function.
- The task is generally more complex than that of the tissue.
- For example, the heart is made of muscle and connective tissues which function to pump blood throughout the body.

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Systems

- A group of two or more organs that work together to perform a specific function.
- Each organ system has its own function but the systems work together and depend on one another.
- There are eleven different organ systems in the human body: circulatory, digestive, endocrine, excretory (urinary), immune, integumentary (skin), muscular, nervous, reproductive, respiratory, and skeletal.

It is not essential for students to know the major tenets of the cell theory or explain the process of cell differentiation as the basis for the hierarchical organization of organisms as these concepts will be further developed in high school biology.

Assessment Guidelines:

The objective of this indicator is to *summarize* the levels of structural organization within the human body; therefore, the primary focus of assessment should be to generalize major points about the different levels of organization (including cells, tissues, organs, and systems). However, appropriate assessments should also require student to *identify* the individual levels of organization; *illustrate* and~~/or~~ *exemplify* the levels of organization using words, pictures, or diagrams; ~~or~~ *classify* by sequencing the levels of organization; *exemplify* types of tissues; or *identify* the systems in the body.